

REMARKS

In response to the Final Office Action mailed June 1, 2007, Applicants respectfully request reconsideration. To further the prosecution of this application, amendments have been made in the claims, and each of the rejections set forth in the Office Action has been carefully considered and is addressed below. The claims as presented are believed to be in condition for allowance.

Claims 1-20 were previously pending in this application. No claims have been amended, added or canceled. As a result, claims 1-20 remain pending for examination, with claims 1 and 11 being independent. No new matter has been added.

Telephone Interview with Examiner

Applicant's representatives thank Examiner Millikin for the courtesies extended in granting and conducting a telephone interview on June 28, 2007. The substance of the interview is summarized herein.

During the interview, Applicant's representatives provided an overview of embodiments of the invention, which relate generally to analyzing the tempo of an input sound signal. By way of background, it was explained that conventional approaches to analyzing a tempo involve (1) acquiring audio data as time-series data; (2) calculating an auto-correlation of the audio data to detect peak positions, thereby acquiring candidates for a tempo; (3) analyzing the beat structure of the audio data using the peak positions in the auto-correlation pattern; and (4) estimating a tempo based on the tempo candidates and the beat structure analysis results (see Applicant's specification at, e.g., p.1 line 19 – p. 2, line 3). It was further explained that this technique imposes a substantial load on a CPU, and requires substantial memory, such that it can not be performed by many small-scale in-auto and home audio systems without great expense (p.2, lines 15-19).

Accordingly, one embodiment of Applicant's invention provides a technique for identifying a tempo of an input sound signal without imposing a large load on the CPU or substantial memory (p. 3, lines 3-7). In this respect, claim 1 recites a method comprising, *inter alia*, detecting positions of a plurality of ones, higher than a predetermined threshold, of peaks of change in level of an input

sound signal; detecting a time interval between the peak positions in a predetermined unit-time interval; and identifying the tempo based on a frequently occurring one of the detected time intervals. Claim 1 is rejected under 35 U.S.C. §102 as purportedly being anticipated by U.S. Patent No. 5,614,687 to Yamada, et al ("Yamada").

During the interview, Applicant's representatives explained that Yamada fails to meet all of the limitations of claim 1, as Yamada fails to disclose or suggest identifying a tempo of sound on a basis of a frequently occurring time interval between positions of peaks of change in level of an input sound signal. Rather, Yamada discloses identifying a beats per minute (BPM) of an input audio signal by detecting an interval which begins when the audio signal first reaches a high level and ends when the audio signal again reaches the high level, and calculating the BPM based on the detected interval (col. 3, lines 57-63).

More specifically, Yamada discloses that when an audio signal is received, the maximum value of the signal is detected (col. 3, lines 23-24). A slice level equal to 75% of the maximum value is calculated (col. 3, lines 28-29). The output of a Band Pass Filter (BPF) is compared to the slice level (col. 3, lines 31-34). A reset is generated when the output signal of the BPF exceeds the slice level (col. 3, lines 34-46). Upon the reset, interval T1 is begun (col. 3, lines 36-41). During interval T1, the system determines when the output of the BPF first becomes a high level, and then stops the measurement when the output of the BPF again reaches that high level (col. 3, lines 58-62). The time difference between when the signal first reached the high level and again reached the high level is defined as interval T2 (col. 3, lines 62-63). Based on the interval T2, the BPM is calculated (col. 3, lines 63-64). An average BPM is calculated over time (col. 4, lines 1-4), and the system of Yamada detects, when the BPM is within a certain range, whether or not a number of previously detected BPM samples is within 5 beats of the average BPM (col. 6, lines 27-31).

Applicant's representatives pointed out that Yamada simply does not disclose or suggest detecting positions of a plurality of peaks of change in level of an input sound signal, detecting a time interval between the peak positions, and identifying a tempo of sound on a basis of a frequently occurring one of the time intervals.

The Examiner expressed an appreciation for this point, but suggested amendments to the independent claims to clarify this distinction. In particular, the Examiner suggested amending independent claims 1 and 11 to positively recite the identification of a frequently occurring time interval upon which the identification of a tempo is based. The Examiner indicated that amending claims 1 and 11 in this manner would distinguish the claims over Yamada. Independent claims 1 and 11 are so amended herein.

Claim Rejections under 35 U.S.C. § 102

Claims 1-7 are rejected under 35 U.S.C. §102(b) as purportedly being anticipated by U.S. Patent No. 5,614,687 to Yamada, et al ("Yamada"). Amended claim 1 patentably distinguishes over Yamada.

As amended, claim 1 recites a tempo analyzing apparatus comprising: a peak detecting means for detecting positions of a plurality of ones, higher than a predetermined threshold, of peaks of change in level of an input sound signal; a time interval detecting means for detecting a time interval between peak positions detected by the peak detecting means in a predetermined unit-time interval; *an interval frequency detecting means for identifying a frequently occurring one of the time intervals detected by the time interval detecting means*; and an identifying means for identifying a tempo of sound to be reproduced with the sound signal *on a basis of the frequently occurring one of the time intervals detected by the interval frequency detecting means*.

Yamada fails to disclose or suggest the totality of limitations recited by claim 1. For example, Yamada fails to disclose or suggest identifying a frequently occurring time interval between peaks of change in level of an input sound signal. Rather, as discussed in the overview above, Yamada discloses detecting interval T2, defined as the time difference between when an input sound signal first reaches a high level and when it again reaches that high level. Yamada does not disclose or suggest that interval T2 is stored, or that any record is kept of the frequency at which any particular interval T2 occurs. Because Yamada does not disclose or suggest identifying a frequently occurring time interval between peaks of change in level of an input sound signal,

Yamada necessarily fails to disclose or suggest identifying a tempo of sound on the basis of this frequently occurring time interval.

As a result, amended claim 1 patentably distinguishes over Yamada, such that the rejection of claim 1 under 35 U.S.C. §102(b) as purportedly being anticipated by Yamada should be withdrawn.

Claims 2-10 depend from claim 1 and are allowable for at least the same reasons.

Claim Rejections Under 35 U.S.C. § 103

Claims 11-17 are rejected under 35 U.S.C. § 103a as purportedly being obvious over Yamada in view of U.S. Patent No. 6,104,565 to Yamauchi, et al. ("Yamauchi"). Applicants respectfully traverse this rejection, as claim 11 patentably distinguishes over any combination of the cited references.

As amended herein, claim 11 recites a tempo analyzing method. The method comprises steps of: detecting positions of a plurality of ones, higher than a predetermined threshold, of peaks of change in level of an input sound signal; detecting a time interval between the detected peak positions in a predetermined unit-time interval; *identifying one of the detected time intervals as having occurred at a high frequency*; identifying a tempo of sound to be reproduced with the sound signal *on a basis of the identified time interval*; and displaying an image corresponding to the identified tempo on an image display device.

The Final Office Action relies on Yamada to satisfy all of the limitations of claim 11 except for displaying an image corresponding to the identified tempo on an image display device. It should be clear from the discussion above relating to claim 1 that Yamada fails to disclose or suggest identifying a time interval as having occurred at a high frequency, or identifying a tempo of sound on a basis of the identified time interval.

Accordingly, independent claim 11 patentably distinguishes over any combination of the asserted references, such that the rejection of claim 11 under 35 U.S.C. § 103(a) as purportedly being obvious over Yamada in view of Yamauchi should be withdrawn.

Claims 12-20 depend from claim 11 and are allowable for at least the same reasons.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Dated: July 27, 2007

Respectfully submitted,

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